09DK054-094
Air-Cooled Condenser Units
50/60 Hz

COMMERCIAL UNITARY SYSTEMS

Wiring Diagrams

INDEX

UNIT	DESCRIPTION	DRAWING NUMBER	FIG. NO.
09DK054-094	Field Wiring	09DK500319	1
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LEGEND

ATS — Air Temperature Switch
AWG — American Wire Gage
CR — Control Relay
DU — Dummy Terminal
EQUIP — Equipment
FC — Fan Contactor
FCPS — Fan Cycle Pressure Switch
FIOP — Factory-Installed Option
FM — Fan Motor
GND — Ground
MMSN — Motormaster® Sensor
NEC — National Electrical Code
PL — Plug Assembly
PRI — Primary
SEC — Secondary
TB — Terminal Block
TRAN — Transformer
XL — Across-the-Line Start

Terminal Block Connection

Marked Terminal

Unmarked Terminal

Unmarked Splice

Marked Wire

Factory Wiring

Field Wiring

Indicates common potential; does not represent wiring.

NOTES

1. Units are factory wired for a 50/50% capacity split. If 100% capacity is required, connect the factory-supplied jumpers from TB2-1 to TB3-1 and from TB2-2 to TB3-2. If jumpers are connected for 100% capacity, only one control power supply is required.
2. When a fan control kit is used, the jumper from TB2-1 to TB3-1 and from TB2-2 to TB3-2 must be connected. The fan control kit is factory wired for 67/33% capacity split. If a 33/33/33% capacity split is required, remove the jumper from TB4-1 to TB5-1 and from TB4-2 to TB5-2. If a 33/33/17/17% capacity split is required, remove the jumper from TB4-1 to TB5-1 to TB7-1 and from TB4-2 to TB5-2 to TB7-2.
3. On fan control kits, 208/230-v units are factory wired for 230-v power supply. For 208-v power supply, connect yellow wire to terminal marked H2.
4. Terminal blocks TB2, TB3, TB4, TB5, TB6, and TB7 are for external field control connections. Control connections are to be class 1 wiring, 14 AWG (2.08 mm^2) copper conductors only.
5. Wiring for field power supply must be rated 75° C minimum. Use copper, copper-clad aluminum, or aluminum conductors. Maximum incoming wire size for each terminal block is 2/0 (67.4 mm^2).
6. Replacement of factory wires must be with 105° C appliance wiring material or its equivalent.
7. Factory wiring is in accordance with National Electrical Code (NEC). Field modifications or additions must be in compliance with all applicable codes.
8. Fan motors are thermally protected. Three-phase motors are protected against primary single phasing conditions.
9. Line numbers on the left side of the label diagrams indicate the contact number. The numbers on the right side of the label diagrams match the contacts with their corresponding coils. A plain number indicates normally open contacts. An underlined number indicates normally closed contacts.
10.

MAIN POWER SUPPLY V-PH-HZ	CONTROL CIRCUIT V-PH-HZ
208/230-3-60 460-3-60 575-3-60	115-1-60
380-3-60	230-1-60
380/415-3-50	230-1-50

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

OPERATION

Accessories

FAN CONTROL KIT (054-084 Units Only) — With the 67/33%, 33/33/33% and 33/33/17/17% nominal capacity split options, 3 or 4 FCPSs are used. For these applications, an accessory fan control kit is required.

Fans 2, 4, and 6 are shared by the 67% and 33% refrigerant circuits on 67/33% applications. With 33/33/33% applications, fans 1, 3, 5 and 2, 4, 6 are shared by two of the 33% refrigerant circuits. With 33/33/17/17% applications, fans 1, 3, 5 and 2, 4, 6 are shared by a 33% and a 17% refrigerant circuit. The fan control kit ensures that the fans operate when needed for efficient control.

NOTE: Fans 5 and 6 are used on 09DK074 and 084 units only.

The fan control kit panel is factory wired for a 67/33% capacity split. It utilizes TB4 for the 67% control circuit and TB6 for the 33% control circuit. See Fig. 1 for wiring details for 67/33%, 33/33/33%, and 33/33/17/17% capacity splits. To determine fan and refrigeration circuit connections, refer to fan control kit accessory installation instructions.

TRANSFORMER — The control transformer is used to convert 208, 230, or 460 v to 115 v for use on 115 v condenser unit control systems, sourcing power from the main unit power connections.

MOTORMASTER® III HEAD PRESSURE CONTROL DEVICE — The Motormaster III device is a motor speed control which adjusts condenser fan motor speed in response to changes in liquid temperatures. A properly applied Motormaster III control extends the operating range of air conditioning systems and permits operation at lower outdoor ambient temperatures.

The Motormaster III control permits operation of the unit to an ambient temperature of –20 F (–29 C). This device controls the speed of 3-phase fan motors that are compatible with the Motormaster III control. These motors are installed at the factory and are used on fans 1 and 2.

NOTE: Two Motormaster III controls must be added for each of these units, one for each circuit.

For more information, refer to the Motormaster III accessory installation instructions.

MOTORMASTER III RELAY/SENSOR KIT (054-084 Units Only) — The Motormaster III Relay/Sensor kit is used to provide efficient control of the primary fans (fans 1 and 2) on 09DK condensers with nominal 67/33%, 33/33/33%, and 33/33/17/17% split applications. On 67/33% applications, fan no. 2 is shared by the 33% and 67% refrigerant circuits. This accessory ensures that the first circuits on and the last circuits off control the Motormaster III device. One kit is required for 67/33% applications. Two kits are required for 33/33/33% and 33/33/17/17% applications. See Motormaster III Relay/Sensor kit accessory installation instructions for more information.

Sequence of Operation — The 09DK units have fully automatic intermediate-season head pressure control through condenser fan cycling, using electro-mechanical fan cycling controls. Standard head pressure controls are supplied for 100% and 50/50% condenser capacity applications. Other circuit split applications (67/33%; 33/33/33%; 33/33/17/17% nominal capacity splits) require the accessory fan control kit.

In the standard control scheme, fans 1 and 2 are on when there is a call for cooling from their respective control circuits. Fans 1 and 2 are non-cycling. On all units, fans 3 and 4 are controlled by a fan cycling pressure switch that responds to condensing pressure on each of the primary coil circuits. On 074-094 units, fans 5 and 6 are controlled by two air temperature switches that respond to the outdoor ambient temperature. The air temperature switches are located on the control box shelf.

Fan cycling pressure switch control: Fans 3 and 4 are on above 260 ± 15 psig (1793 ± 103 kPa) and off below 160 ± 10 psig (1103 ± 69 kPa). If pressure is rising between 160 psig (1103 kPa) and 260 psig (1793 kPa), fans 3 and 4 are off. If pressure is decreasing from 260 psig (1793 kPa) to 160 psig (1103 kPa) fans 3 and 4 are on.

Air temperature switch control: On the 074-094 condensers, below 70 ± 3° F (21.1 ± 1.7° C) outdoor ambient, fans 5 and 6 are off; above 80 ± 3° F (26.7 ± 1.7° C), fans 5 and 6 are on. Between 70 F (21.1 C) and 80 F (26.7 C) whether fans 5 and 6 are on or off depends on whether temperature is rising or falling. If the temperature is rising from 70 F (21.1 C) to 80 F (26.7 C), fans 5 and 6 are off. If the temperature is falling from 80 F (26.7 C) to 70 F (21.1 C) fans 5 and 6 are on.

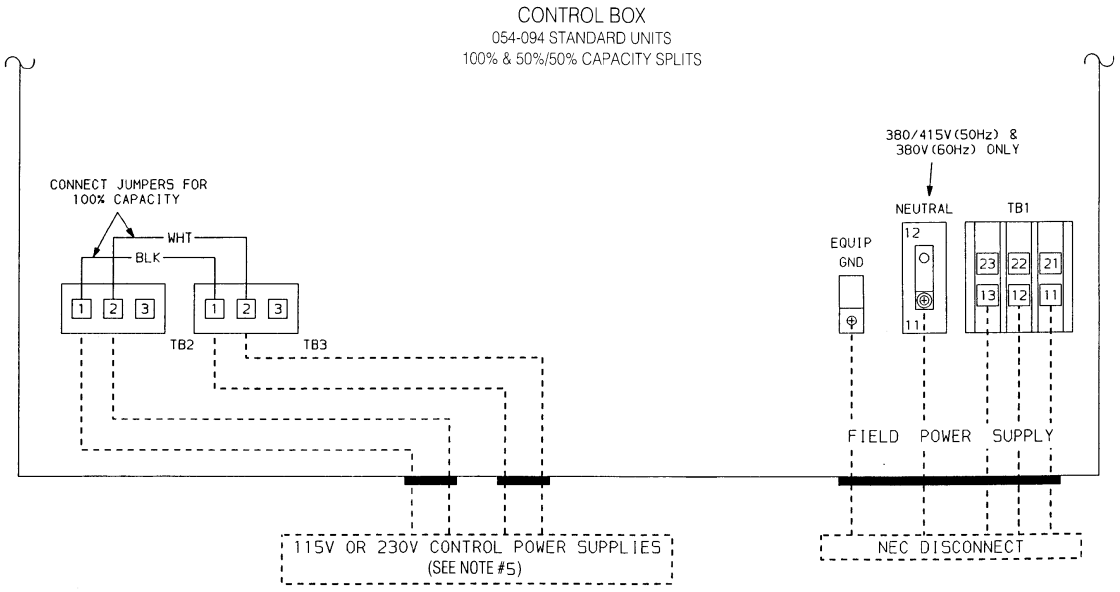
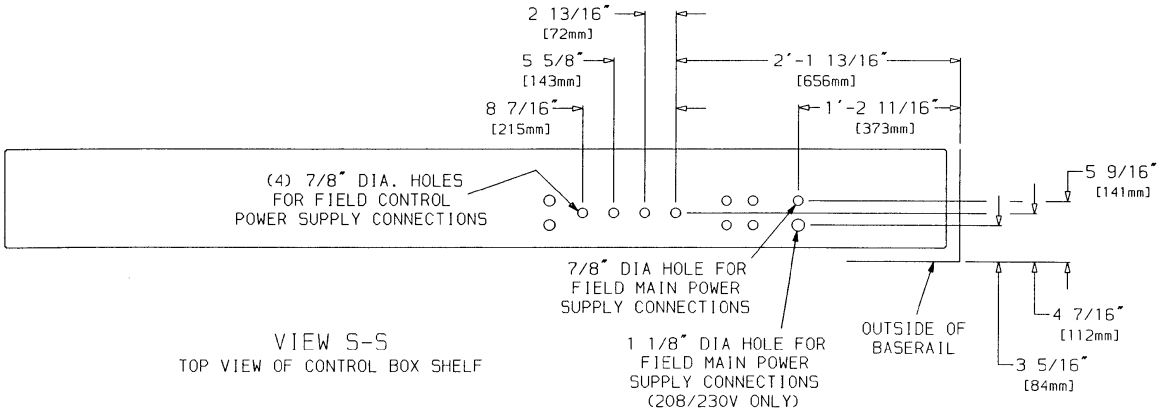


Fig. 1 — Field Wiring; 054-094 Units



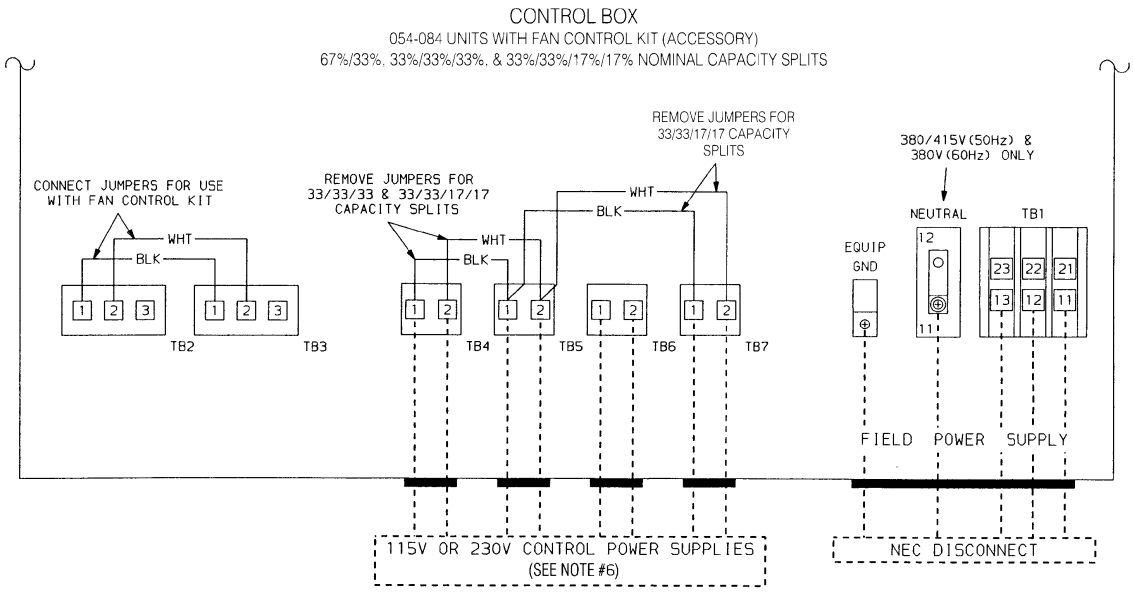


Fig. 1 — Field Wiring; 054-094 Units (cont)

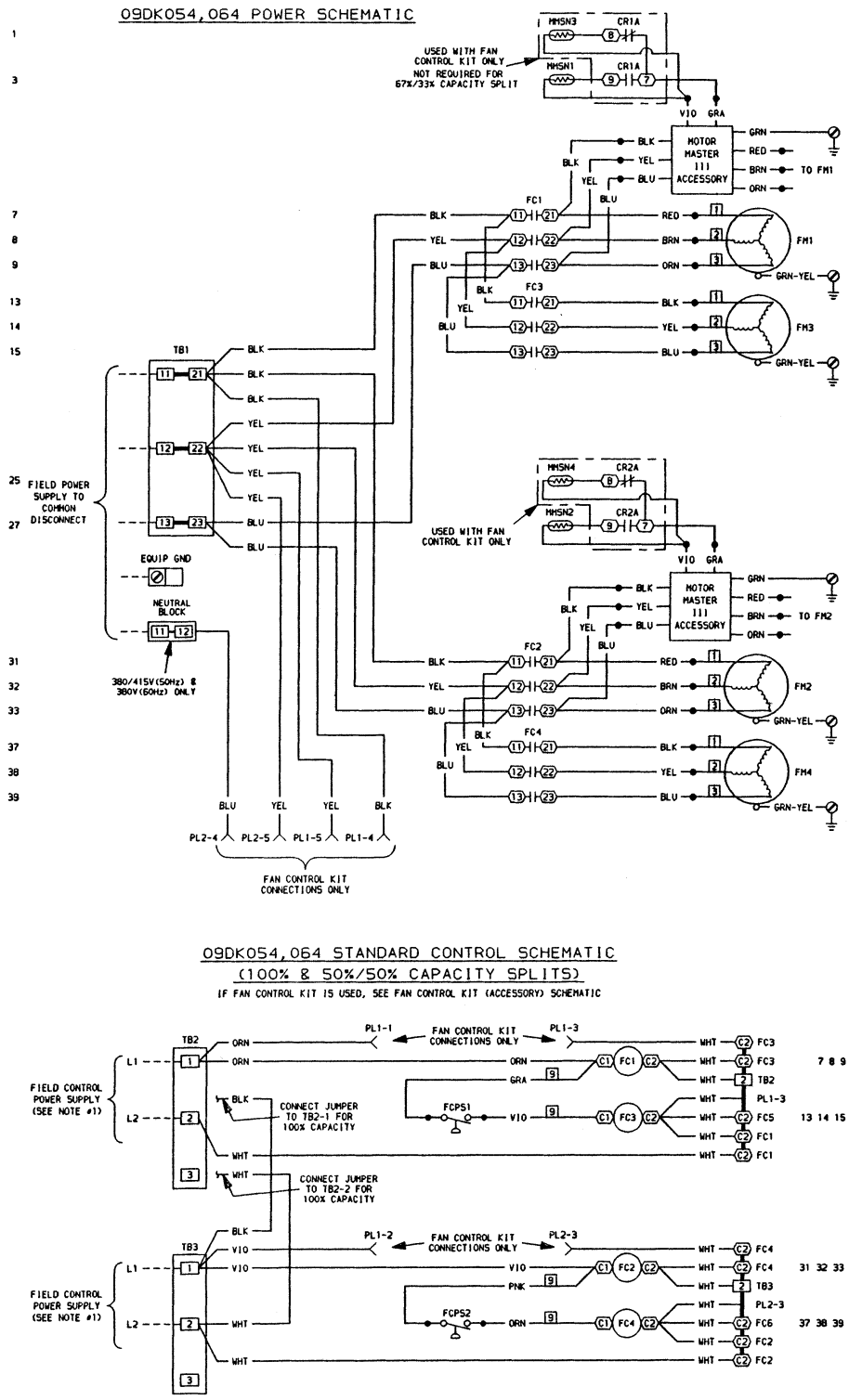


Fig. 2 — Wiring Diagram and Component Arrangement; 054 and 064 Units

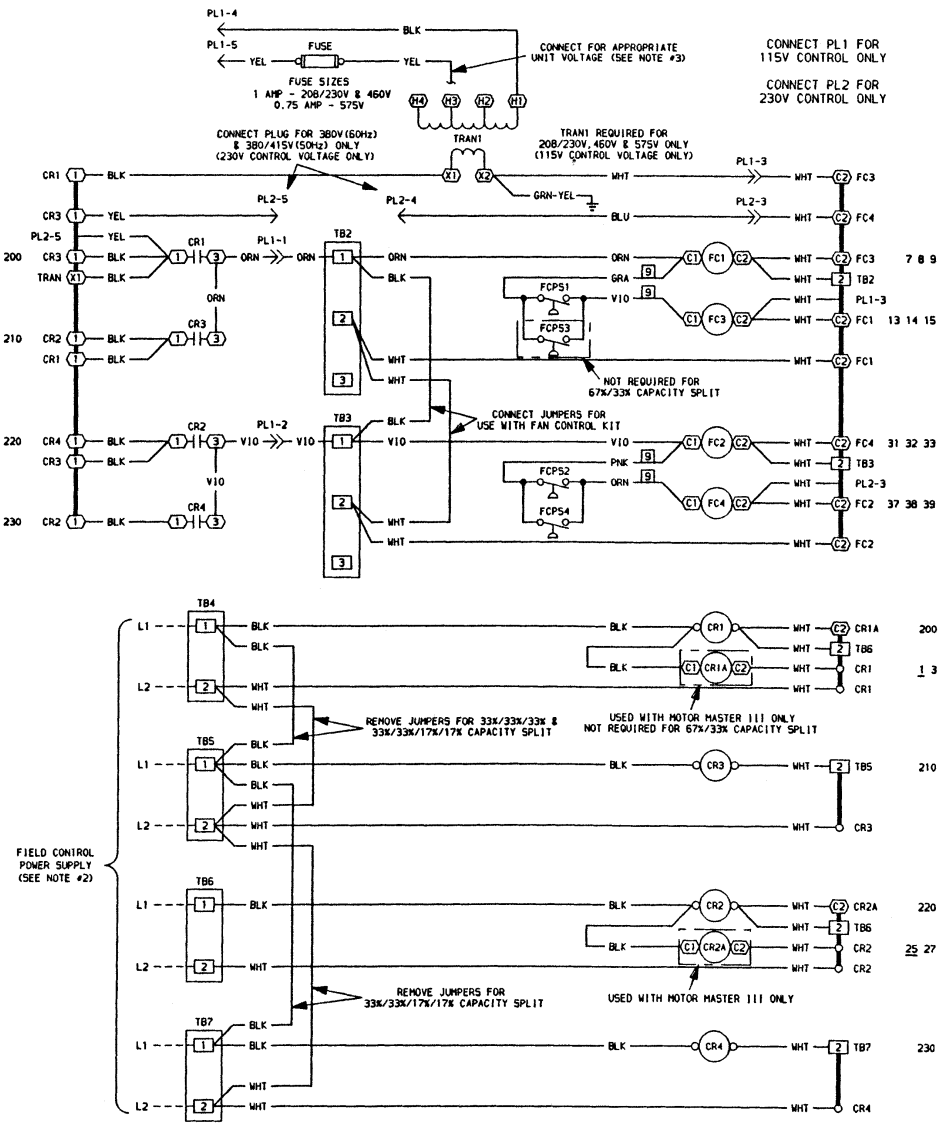

09DK054,064 FAN CONTROL KIT (ACCESSORY) SCHEMATIC
(67%/33%, 33%/33%/33% & 33%/33%/17%/17% CAPACITY SPLITS)
CONNECT PL1 FOR 115V CONTROL ONLY
CONNECT PL2 FOR 230V CONTROL ONLY
CONNECT FOR APPROPRIATE UNIT VOLTAGE (SEE NOTE #3)
FUSE SIZES 1 AMP - 208/230V & 460V 0.75 AMP - 575V
CONNECT PLUG FOR 380V(60Hz) & 380/415V(50Hz) ONLY (230V CONTROL VOLTAGE ONLY)
TRAN1 REQUIRED FOR 208/230V, 460V & 575V ONLY (115V CONTROL VOLTAGE ONLY)
NOT REQUIRED FOR 67%/33% CAPACITY SPLIT
CONNECT JUMPERS FOR USE WITH FAN CONTROL KIT
REMOVE JUMPERS FOR 33%/33%/33% & 33%/33%/17%/17% CAPACITY SPLIT
USED WITH MOTOR MASTER III ONLY
NOT REQUIRED FOR 67%/33% CAPACITY SPLIT
REMOVE JUMPERS FOR 33%/33%/17%/17% CAPACITY SPLIT
USED WITH MOTOR MASTER III ONLY
FIELD CONTROL POWER SUPPLY (SEE NOTE #2)

Fig. 2 — Wiring Diagram and Component Arrangement; 054 and 064 Units (cont)

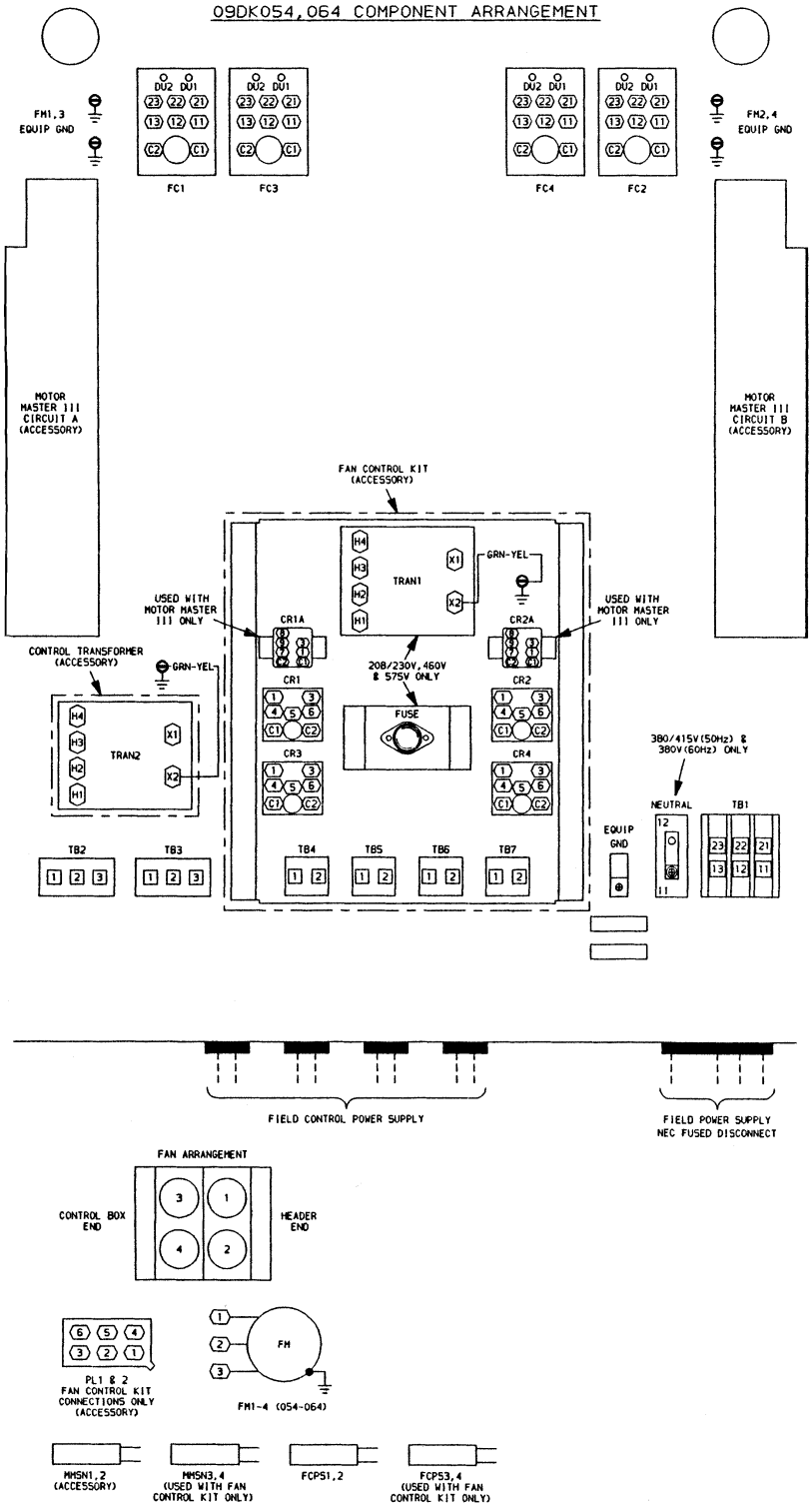


Fig. 2 — Wiring Diagram and Component Arrangement; 054 and 064 Units (cont)

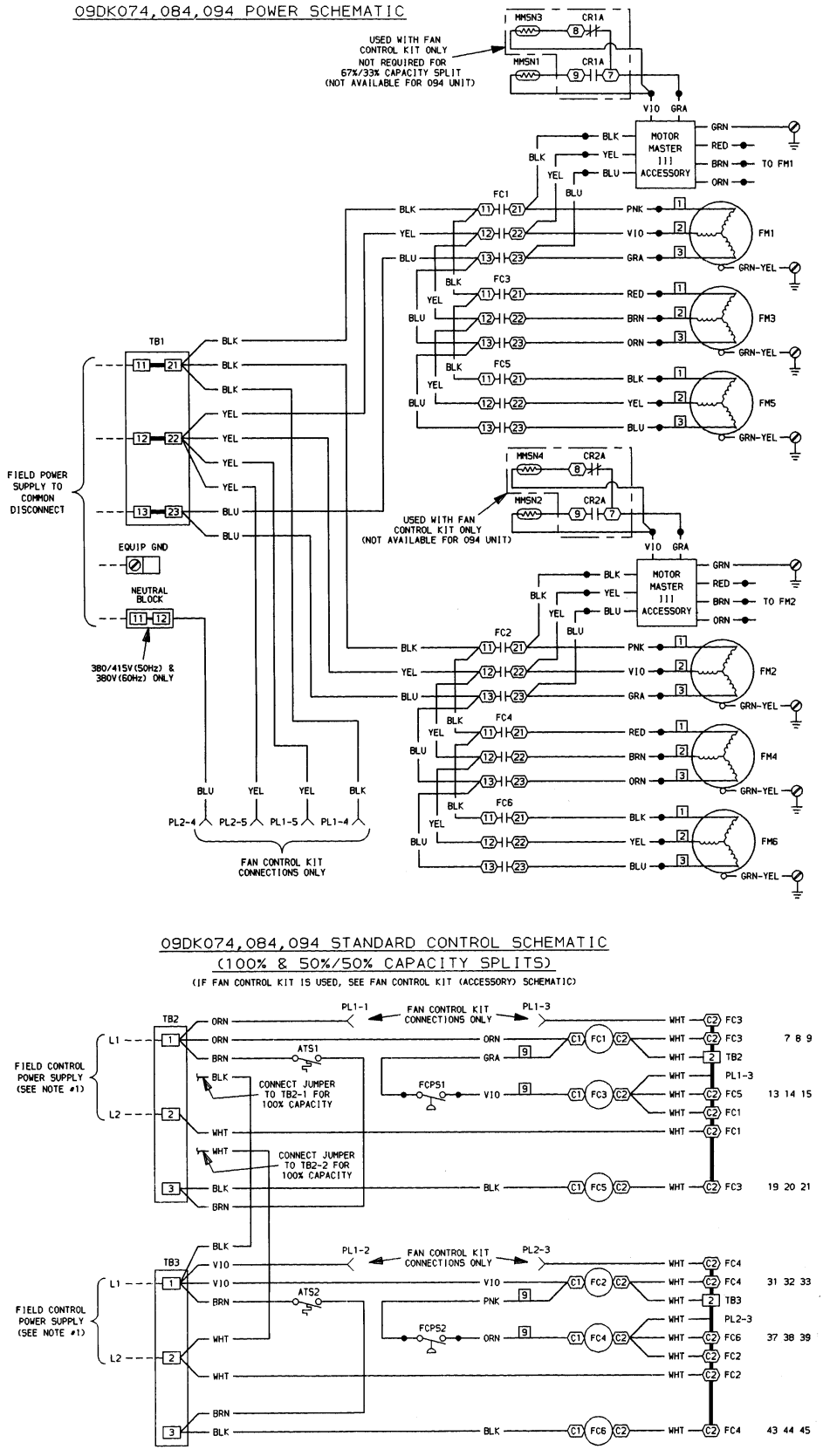


Fig. 3 — Wiring Diagram and Component Arrangement; 074-094 Units

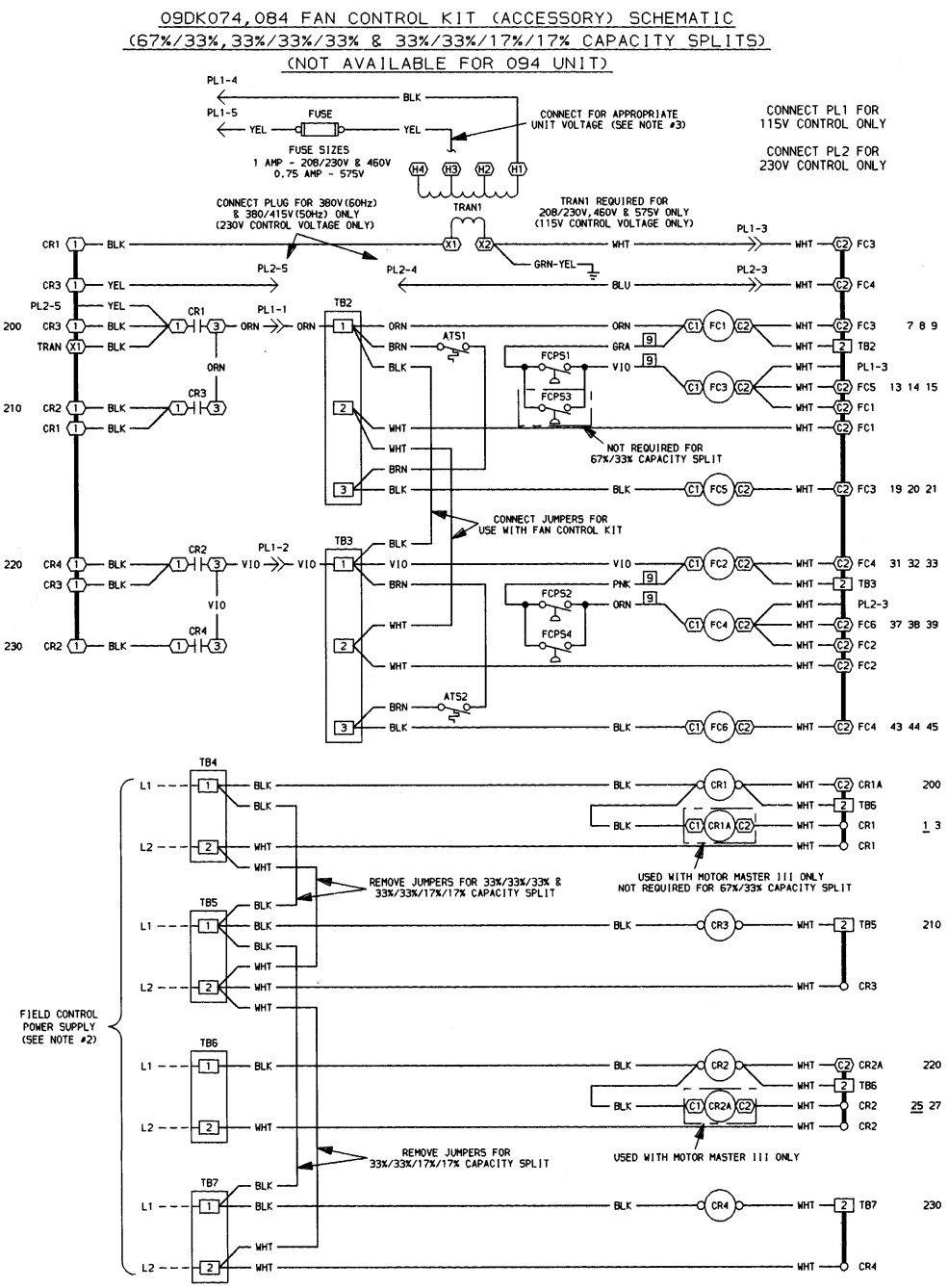

09DK074,084 FAN CONTROL KIT (ACCESSORY) SCHEMATIC
(67%/33%, 33%/33%/33% & 33%/33%/17%/17% CAPACITY SPLITS)
(NOT AVAILABLE FOR 094 UNIT)
CONNECT FOR APPROPRIATE UNIT VOLTAGE (SEE NOTE #3)
CONNECT PL1 FOR 115V CONTROL ONLY
CONNECT PL2 FOR 230V CONTROL ONLY
FUSE SIZES
1 AMP - 208/230V & 460V
0.75 AMP - 575V
CONNECT PLUG FOR 380V(60Hz) & 380/415V(50Hz) ONLY (230V CONTROL VOLTAGE ONLY)
TRAN1 REQUIRED FOR 208/230V, 460V & 575V ONLY (115V CONTROL VOLTAGE ONLY)
NOT REQUIRED FOR 67%/33% CAPACITY SPLIT
CONNECT JUMPERS FOR USE WITH FAN CONTROL KIT
REMOVE JUMPERS FOR 33%/33%/33% & 33%/33%/17%/17% CAPACITY SPLIT
USED WITH MOTOR MASTER III ONLY
NOT REQUIRED FOR 67%/33% CAPACITY SPLIT
REMOVE JUMPERS FOR 33%/33%/17%/17% CAPACITY SPLIT
USED WITH MOTOR MASTER III ONLY
FIELD CONTROL POWER SUPPLY (SEE NOTE #2)

Fig. 3 — Wiring Diagram and Component Arrangement; 074-094 Units (cont)

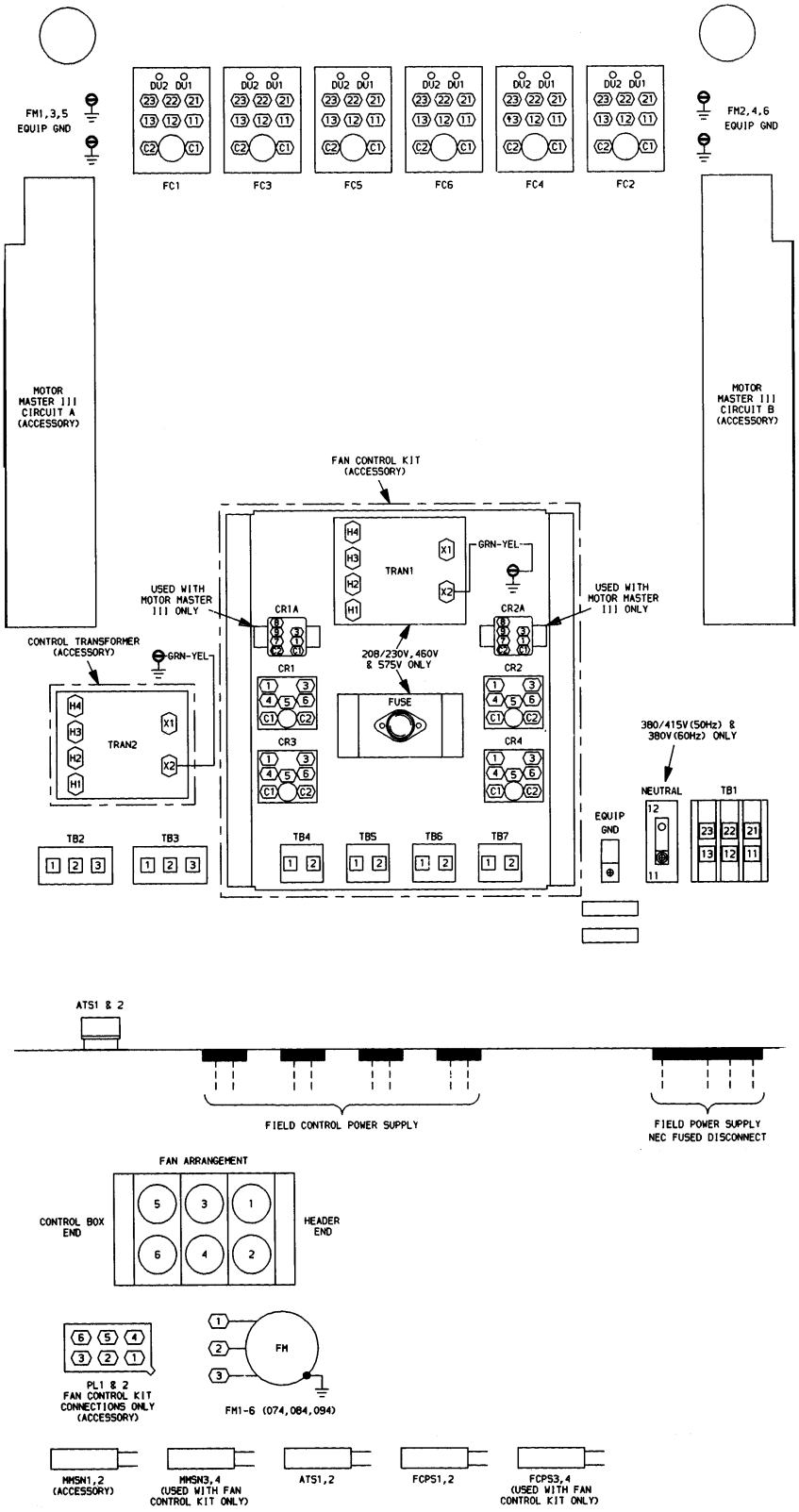


Fig. 3 — Wiring Diagram and Component Arrangement; 074-094 Units (cont)

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